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"To Share or Not to Share?" Serosorting by Hepatitis C Status in the Sharing of Drug Injection Equipment Among NHBS-IDU2 Participants

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Abstract

Background—Persons who inject drugs (PWID) are at high risk for acquiring hepatitis C virus (HCV) infection. The Centers for Disease Control and Prevention estimates there are 17 000 new infections per year, mainly among PWID. This study examines injection equipment serosorting—considering HCV serostatus when deciding whether and with whom to share injection equipment.

Objective—To examine whether injection equipment serosorting is occurring among PWID in selected cities.

Methods—Using data from the National HIV Behavioral Surveillance System-Injection Drug Users (NHBS-IDU2, 2009), we developed multivariate logistic regression models to examine the extent to which participants' self-reported HCV status is associated with their injection equipment serosorting behavior and knowledge of last injecting partner's HCV status.

Results—Participants who knew their HCV status were more likely to know the HCV status of their last injecting partner, compared to those who did not know their status (HCV+: adjusted odds ratio [aOR] 4.1, 95% confidence interval [CI], 3.4–4.9; HCV−: aOR 2.5, 95% CI, 2.0–3.0). Participants who reported being HCV+, relative to those of unknown HCV status, were 5 times

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more likely to share injection equipment with a partner of HCV-positive status (aOR 4.8, 95% CI, 3.9–6.0).

Conclusions—Our analysis suggests PWID are more likely to share injection equipment with persons of concordant HCV status.

Keywords

hepatitis C virus; serosorting; injection drug use; sharing injection equipment

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The Centers for Disease Control and Prevention (CDC) estimates that 4.1 million Americans have been infected with the hepatitis C virus (HCV) with 75%–80% of those chronically infected [1]. While CDC recommends routine antibody testing for persons at risk of HCV exposure [2], recent studies estimate 40%–85% of HCV-infected persons are unaware of their infection status [3–5]. This lack of awareness has important consequences for disease prevention because knowledge of HCV status is often a prerequisite to making health-promoting behavioral changes and treatment decisions.

HCV prevalence has reached epidemic proportions in the United States and is endemic among persons who inject drugs (PWID). HCV is primarily by percutaneous exposure to contaminated blood, making injection drug use (IDU) the leading cause of incidence in the United States. HCV prevalence among PWID resides between 30% and 70%, depending on frequency and duration of use, and incidence ranges from 16%–42% per year [6–8].

With such high prevalence of infection, recent attention has focused on factors that influence a person's decision to share or not to share injection equipment (IE). One such factor is *serostatus*, particularly the question as to whether knowing one's HCV status, and that of a prospective partner, affects a person's decision to share IE. We suggest the complex relationship between a person's serostatus and their decision to share IE can be illuminated, in part, through the concept of *serosorting*.

Serosorting occurs when viral serostatus serves as a determining factor in a person's choice of sex or drug-injecting partners and in the selection of behaviors stemming from that choice. The term has traditionally been used to describe men who have sex with men (MSM), who deliberately select sex partners based on their own and their prospective partner's human immunodeficiency virus (HIV) serostatus [9]. Here, serostatus is characterized as a type of measure whereby people choose a sexual partner based on their own and their partner's HIV status and then base the extent of their sexual activity on that knowledge for the specific purpose of reducing the risk of acquiring or transmitting HIV.

While serosorting has been used most notably to describe the sexual choices of MSM, researchers have recently found similar trends among PWID [10–12]: one study in Seattle reported PWID were more likely to share injection equipment with the last injecting partner of concordant status [10]; an investigation in San Francisco found those who perceived their injecting partner to be HCV-positive were less likely to engage in receptive needle sharing [11]; and in Baltimore, HIV-positive participants reported being less likely to serosort than HIV-negative participants [12]. Bearing in mind these city-specific trends, this study expands their scope by examining injection equipment serosorting among PWID on a national scale. Specifically, we examine the relationships between participant's self-reported HCV status and (*a*) injection equipment sharing behavior, (*b*) knowledge of last injecting partner's HCV status (known/unknown), and (*c*) last injecting partner's HCV status (positive/negative).

METHODS

National HIV Behavioral Surveillance System (NHBS)

NHBS is a community-based survey that conducts interviews in triennial cycles among MSM, heterosexuals at increased risk for HIV infection, and PWID. Its purpose is to track the prevalence of and trends in HIV-related risk behaviors, including sex and injection drug use, and to record levels of HIV testing and the use of HIV prevention services among persons at high risk for HIV transmission such as PWID [13]. The second IDU cycle (NHBS-IDU2) was conducted between September and December 2009 and employed respondent-driven sampling (RDS) [14] to target individuals from social networks that can serve as seeds to recruit their peers into the study. Participating sites included in this analysis were located in Atlanta, Baltimore, Boston, Chicago, Dallas, Denver, Detroit, Houston, Los Angeles, Miami, Nassau, Newark, New Orleans, New York, Philadelphia, San Diego, San Francisco, San Juan, Seattle, and Washington, DC. Across the 20 sites, 10 352 respondents were eligible for NHBS-IDU2 and participated in the study. The current study was restricted to 9690 participants with valid responses to questions concerning their HCV status and the HCV status of their last injection equipment sharing partner within the previous 12 months.

Outcome Measures

The outcomes of interest were (*a*) injection equipment sharing behavior, (*b*) knowledge of last injecting partner's HCV status (known/unknown), and (*c*) last injecting partner's HCV status (positive/negative). The HCV status of respondent and respondent's last injecting partner were both self-reported by the respondent. The HCV status of respondent's last injection partner was derived from the following questions: "The last time you injected with this person (last sharing partner in past 12 months), did you know if they had been tested for hepatitis C?" and if yes, "What was the result of their hepatitis C test?" Respondents were also asked a series of questions with respect to their injection equipment sharing behaviors over the previous 12 months. Equipment sharing was defined to include the reuse of syringes, filters, cookers, water, and the practice of dividing drugs with a syringe (eg, backloading or frontloading). We categorized equipment sharing behavior in 2 different ways. For exploratory bivariate analysis, we dichotomized this variable as *shared* vs *did not share*. We also categorized the same outcome as a 4-level multinomial response variable for subsequent advanced analysis: *shared with HCV-negative partner*, *shared with HCV-positive partner*, *shared with partner of unknown HCV status*, or *shared no injection equipment*.

Independent Variables

The primary independent variable was respondent's HCV status. Based on a review of the literature regarding HCV and injection equipment sharing, we also included the following variables as confounders and/or independent predictors: respondent's gender, race/ethnicity, birth year (as proxy for age), education, homelessness, employment status, annual income, age at first injection, and duration of injection.

Data Analysis

We calculated unweighted proportions to describe the characteristics of the study population. Pearson χ^2 tests were used to explore bivariate associations between all independent variables and outcome variables. Consistent with the stated objectives of this study, we developed 3 separate multivariate logistic regression models to evaluate the associations between the respondent's HCV status and the 3 outcome measures, adjusting for all plausible confounders. First, we modeled equipment sharing (4-level response category) as the dependent variable in a multinomial logistic regression; participants who shared equipment with their last injecting partner of negative, positive, or unknown HCV status were compared to those who did not share. This model was based on the full analytic population (n = 9690). In the second model, we restricted our analysis to respondents who reported sharing equipment (n = 4542) and modeled respondent's knowledge of last injecting partner's HCV status (known/unknown) as the dependent variable. In the third model, we further restricted the analysis to respondents who reported awareness of their last injecting partner's HCV status (n = 1712), and modeled last injection partner's HCV status (positive/negative) as the dependent variable. In all 3 models, respondent's HCV status was the primary explanatory variable. Data were analyzed using SPSS v.18 (IBM, Chicago, IL). We did not account for potential variance inflation induced by the RDS design, due to the limitation of the statistical software used; RDS is a relatively new methodology and is not currently incorporated into multivariate procedures available in standard statistical software.

RESULTS

Of the NHBS-IDU2 participants, 9690 respondents self-reported both their HCV status and the HCV status of their last injecting partner. Of all participants, 7270 (75.0%) reported knowing their HCV status and 4128 (56.8%) of those reported HCV positivity. Nearly 47 percent of all participants (n = 4542) reported sharing equipment with their last injecting partner in the previous 12 months, and of those 37.7% (n = 1712) said they were aware of the HCV status of their last sharing partner. The demographic characteristics of participants are shown in Table 1. Approximately 71.8% were male, 21.6% Hispanic, 46.8% non-Hispanic black, and 27.1% non-Hispanic white. Respondents were born between 1930 and 1991, with a mean of 1963 (ie, approximately 46 years of age). About 13.3% of respondents were employed, 57.3% were unemployed, and 24.1% were disabled for work. More than 61% of respondents reported ever being homeless, and 32.1% reported injecting before the age of 18 years.

Association Between Participant's HCV Status and Sharing Equipment With Last Injection Partner

In bivariate analysis, all independent variables, with the exception of injection duration, were significantly associated with participant's equipment sharing behavior (Table 1). Following multivariate adjustment in a multinomial logistic regression, HCV-negative participants, compared to those of unknown HCV status, were more likely to share equipment with an HCV-negative injecting partner vs not sharing (adjusted odds ratio [aOR] 2.0, 95% confidence interval [CI], 1.6–2.6) (Table 2). Similarly, the odds of sharing with an HCV-positive partner, vs not sharing, is increased nearly 5-fold (aOR 4.8, 95% CI, 3.9–6.0) for HCV-positive participants relative to those of unknown HCV status. In contrast, respondents with known HCV status, compared to those of unknown HCV status, were less likely to share with a partner of unknown HCV status vs not sharing (HCV-positive: aOR .8, 95% CI, .7–.9; HCV-negative: aOR .6, 95% CI, .5–.7). Other variables found to be significantly related to injection equipment sharing behavior after multivariate adjustment were gender, race/ethnicity, birth year, education, history of homelessness, employment, and age at first injection (Table 2).

Association Between Participant's HCV Status and Knowledge of Sharing Partner's HCV Status

The results of multivariate logistic regression analysis examining the relationship between participant's self-reported HCV status and knowledge of last injecting partner's HCV status are presented in Table 3. Among respondents who shared injection equipment, those who knew their HCV status were more likely to know their last injecting partner's HCV status compared to those with unknown HCV status: HCV-negative participants (aOR 2.5, 95% CI, 2.0–3.0) were more than 2 times and HCV-positive participants (aOR 4.1, 95%CI, 3.4–4.9) were more than 4 times more likely to have knowledge of their last partner's HCV status compared to respondents who reported an unknown HCV status. Female gender, non-Hispanic white race/ethnicity, educational attainment of high school or more, disabled status, and higher annual income were also positively associated with knowledge of last partner's HCV status. Non-Hispanic black race/ethnicity and history of homelessness were associated with lack of knowledge of last partner's HCV status.

Association Between Participant's HCV Status and Sharing Partner's HCV Status

Table 4 shows the results of a multivariate logistic regression model examining the association between participant's self-reported HCV status and last injecting partner's HCV status. Among the respondents who shared injection equipment and reported knowing their last injecting partner's HCV status, HCV-positive persons (aOR 4.6, 95% CI, 3.2–6.4) were nearly 5 times more likely to report their last injecting partner's HCV status as positive relative to persons with an unknown HCV status. By comparison, HCV-negative persons (aOR .4, 95% CI, .3–.6) were 60% less likely to report their last injecting partner's HCV status as positive relative to persons with an unknown HCV status. Non-Hispanic black participants were less likely to report their injecting partner's HCV status as positive compared to Hispanics. Participants with a history of homelessness and those born from 1930 to 1954, respectively, were more likely to report their injecting partner as HCV positive relative to persons who had never been homeless and those born between 1975 and 1991.

DISCUSSION

The strong association between the HCV status of survey respondents and the HCV status of their last injection partner is evidence indicating that PWID are injection equipment serosorting. Our analysis found that PWID are injection equipment serosorting given that study participants were more likely to share injection equipment (IE) with people of concordant HCV status. This outcome corroborates earlier findings demonstrating a correlation between a person's awareness of his/her HCV status and choice of injecting partners [10].

Serosorting is well documented in the literature but largely in the context of HIV risk reduction. Researchers focusing on the sexual choices of MSM [15, 16] have found serosorting is associated with decreased risk of HIV infection [17] and changes in the sexual behavior of MSM when it is employed as an HIV risk-reduction strategy [18]. Serosorting has also been documented among HIV-positive PWID [19]. They have been shown to be more likely to disclose their infection status to other infected persons and more likely to seek out concordant drug-using relationships [12] than HIV-negative persons. HIV-positive PWID in serodiscordant sexual relationships were also found to be more likely to modify their injecting and sexual behavior than participants who were HIV-negative [20] and less likely to engage in less safe drug use and risky sexual behaviors [21]. These findings demonstrate that PWID have the capacity to employ risk reduction behaviors meant to protect their health and that of their injection partners [22, 23].

In this way, serosorting can be applied to drug injection behavior when the act of choosing an injecting partner is based in part on one's own infection status and that of the prospective injecting partner's for the specific purpose of reducing the risk of acquiring or transmitting bloodborne pathogens during an injection episode. Here, serosorting can be categorized as a risk-reduction strategy when the decision to share or not to share injection equipment is influenced by serostatus and enacted by people unable or unwilling to cease injecting drugs, but who nevertheless want to protect their and their injecting partner's health when injecting drugs together. Following this logic, both the act of selecting an injecting partner of concordant infection status and the act of avoiding sharing injection equipment with a person of discordant infection status would be categorized as injecting equipment serosorting [24].

The hepatitis C literature provides a modicum of evidence that knowledge of one's own or another's HCV status can influence how or with whom people inject. One study in Seattle reported PWID were more likely to share injection equipment with the last injecting partner of concordant status [10], while in San Francisco those who perceived their injecting partner to be HCV-positive were found to be less likely to engage in receptive needle sharing [11]; and in Baltimore, HIV-positive participants reported being less likely to injection equipment serosort than HIV-negative participants [12]. The evidence, however, is not entirely positive. Numerous studies show that knowledge of one's HCV status has nominal influence on reducing behaviors that put PWID at risk for acquiring or transmitting bloodborne disease [25–27]. A study of young PWID found no association between HCV-positive status and reductions in less safe injecting practices or choice of injecting partners [28], and another found injecting partners not discriminating based on serostatus and sharing injection equipment just as frequently with sexual partners of concordant and discordant status [29].

This variation notwithstanding, our analysis of the NHBS-IDU2 data establishes a strong association between a survey respondent's knowledge of their HCV status and the selection of an injecting partner. This correlation is deduced from 4 significant findings: (1) a person knowing their HCV status was more likely to know their last injection partner's HCV status; (2) a person knowing their HCV status was less likely to share injection equipment with a partner of unknown HCV status; (3) a person knowing their HCV-negative status was more likely to share injection equipment with a partner that was also HCV-negative; (4) a person knowing their HCV-positive status was more likely to share equipment with a partner reporting an HCV-positive status. These findings suggest that PWID may be serosorting by selectively sharing injecting equipment with persons of corresponding HCV status.

This article is not intended to promote injection equipment serosorting as a HCV risk-reduction strategy for PWID but to report that participants were more likely to share syringes with persons of concordant serostatus. One problem that can be expected if injection equipment serosorting is adopted by PWID is the potential effect of incomplete knowledge of infection status. If PWID know they are anti-HCV positive but mistakenly believe they are infected (when they have actually cleared the virus and are negative for HCV RNA), they could opt to serosort injection equipment with infected persons based on this misunderstanding, placing themselves at risk. This issue highlights the importance of conducting HCV RNA tests for all HCV antibody-positive persons and ensuring that they receive and understand their results.

A similar challenge that arises when PWID serosort by injection equipment is the injecting partner's knowledge of their own HCV status. This requires both accurate knowledge and understanding by the injection partner and full disclosure of their HCV status. Although there are proven effective HIV testing and counseling interventions [30], as well as effective interventions to improve disclosure skills for HIV-positive persons [31], there are no HCV-specific interventions to improve either of these factors. Much can be learned from these established interventions, but HCV test results and counseling messages and disclosure issues require more nuanced communication given the 2-step testing process to determine HCV-infection status and the knowledge needed to understand and disclose that information to injection partners.

This study has some limitations. Unlike several previous studies of serosorting [10], the national data collected through the NHBS-IDU2 study did not include information regarding participants' *intention* to serosort. It thus remains unknown if the high level of serosorting observed in this study was driven by an intention to do so. Further research needs to be conducted to explore whether intention to serosort is based on the HCV infection status of self and other, and what other factors may be contributing to this behavior. Additional limitations were related to the participant recruitment. The lack of adjustment for the design effect of RDS may have resulted in biased prevalence estimates and artificially smaller standard errors in bivariate analysis; however, there is no consensus on the statistical methods for conducting multivariate analysis [32–37]. Moreover, participants' and their partners' HCV status were self-reported and do not represent actual prevalence, and injecting equipment serosorting behavior is based on participants' perceived HCV status. Future research should thus include analyses of serosorting behavior based on actual vs perceived HCV status. Finally, given the unexplained differences in knowledge of serostatus by gender, race, educational attainment, and homelessness, additional research should be conducted to examine these issues fully.

CONCLUSION

Our analysis of the NHBS-IDU2 data points to the possibility that PWID are serosorting based on knowledge of their and their injecting partners' HCV status. If accurate, the ability to increase PWID's awareness of their HCV status will have important consequences for public health and disease prevention, as it could be an influential element in a person's decision to make health-promoting behavioral changes and their choice of medical treatment. In sum, increasing the proportion of PWID who are aware of their HCV status may contribute to a general increase in the adoption of risk reduction strategies by persons who inject drugs.

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Table 1

Demographic Characteristics of Study Participants, NHBS Injection Drug Users Second Cycle, 2009

	All Participants (N = 9690[a])		Shared Equipment With Last Injection Partner (N = 4542)		Did Not Share Equipment With Last Injection Partner (N = 5148)		
Participant Characteristic	no.	%	no.	%	no.	%	*P* Value[b]
Gender							
Female	2678	27.6	1328	29.2	1345	26.1	<.001
Transgender	55	.6	27	.6	28	.5	.624
Male	6961	71.8	3187	70.2	3774	73.3	Ref
Race/ethnicity							
Non-Hispanic Black	4528	46.8	2011	44.3	2517	48.9	<.001
Non-Hispanic White	2623	27.1	1279	28.2	1344	26.1	.283
Other[c]	434	4.5	193	4.3	241	4.7	<.05
Hispanic	2090	21.6	1052	23.2	1038	20.2	Ref
Birth Year							
1965–1974	2195	22.7	1104	24.3	1091	21.2	.176
1955–1964	3621	37.4	1656	36.5	1965	38.2	<.001
1945–1954	2001	20.7	827	18.2	1174	22.8	<.001
1930–1944	127	1.3	39	.9	88	1.7	<.001
1975–1991	1746	18.0	916	20.2	830	16.1	Ref
Educational attainment							
High school graduate	6361	65.7	2873	63.3	3488	67.8	<.001
Less than high school	3327	34.3	1668	36.7	1659	32.2	Ref

Participant Characteristic	All Participants (N = 9690[a])		Shared Equipment With Last Injection Partner (N = 4542)		Did Not Share Equipment With Last Injection Partner (N = 5148)		*P* Value[b]
	no.	%	no.	%	no.	%	
Ever homeless				.0		.0	
Yes	5929	61.2	3116	68.6	2813	54.6	<.001
No	3759	38.8	1424	31.4	2335	45.4	Ref
Employment status							
Unemployed	5550	57.3	2750	60.5	2800	54.4	<.001
Disabled for work	2339	24.1	1049	23.1	1290	25.1	.086
Other	511	5.3	202	4.4	309	6.0	.359
Employed	1289	13.3	540	11.9	749	14.5	Ref
Annual income[d]							
$0–$14 999	7462	77.4	3552	78.2	3910	76.0	Ref
$15 000 or more	2177	22.6	966	21.3	1211	23.5	<.01
Age at first injection use, years							
<18	3110	32.1	1518	33.4	1592	30.9	Ref
18–24	3580	37.0	1711	37.7	1869	36.3	.406
≥25	2991	30.9	1309	28.8	1682	32.7	<.001
Injection duration				.0		.0	
0–5 y	1071	11.1	505	11.1	566	11.0	Ref
6–15 y	2145	22.2	1053	23.2	1092	21.2	.300
16–25 y	2010	20.8	968	21.3	1042	20.2	.594
>26 y	4455	46.0	2012	44.3	2443	47.5	.240

Participant Characteristic	All Participants (N = 9690[a])		Shared Equipment With Last Injection Partner (N = 4542)		Did Not Share Equipment With Last Injection Partner (N = 5148)		*P* Value[b]
	no.	%	no.	%	no.	%	
Self-reported HCV status							
Negative	3142	32.4	1262	27.8	1880	36.5	<.001
Positive	4128	42.6	2127	46.8	2001	38.9	<.01
Unknown	2420	25.0	1153	25.4	1267	24.6	ref

Abbreviations: HCV, hepatitis C virus; NHBS, National HIV Behavioral Surveillance System.

[a]Not all information was available for every participant.

[b]*P* value for χ^2 test of categorical variables.

[c]All other race/ethnic groups including persons identifying with multiple races/ethnicities.

[d]2010 poverty guideline (2-person family = $14 570).

Table 2

Adjusted Odds Ratios for the Association Between Participant's Self-reported HCV Status and Injection Equipment Sharing Behavior, NHBS Injection Drug Users Second Cycle (N = 9612[a]), 2009

	Shared With HCV(−) Partner vs No Sharing	Shared With HCV(+)Partner vs No Sharing	Shared With HCV (Unknown) Partner vs No Sharing
Participant Characteristic	**Adjusted[b] OR (95% CI)**	**Adjusted[b] OR (95% CI)**	**Adjusted[b] OR (95% CI)**
Self-reported HCV status			
Negative	2.0 (1.6, 2.6)[c]	.8 (.6, 1.1)	.6 (.5, .7)[c]
Positive	1.1 (.9, 1.5)	4.8 (3.9, 6.0)[c]	.8 (.7, .9)[c]
Unknown	Ref	Ref	Ref
Gender			
Female	1.7 (1.4, 2.0)[c]	1.7 (1.5, 2.0)[c]	.9 (.8, 1.0)
Male	Ref	Ref	Ref
Race/ethnicity			
Black	.8 (.7, 1.1)	.6 (.5, .7)[c]	1.2 (1.1, 1.4)[d]
White	1.1 (.9, 1.4)	1.1 (.9, 1.4)	.8 (.7, .9)
Hispanic	Ref	Ref	Ref
Birth year			
1930–1944	.4 (.1, 1.0)	.7 (.3, 1.5)	.4 (.2, .7)[c]
1945–1954	.5 (.3, .8)[d]	.8 (.5, 1.2)	.6 (.5, .8)[c]
1955–1964	.5 (.3, .7)[c]	.9 (.6, 1.2)	.8 (.6, 1.0)[e]
1965–1974	.7 (.5, .9)[e]	1.0 (.8, 1.3)	.9 (.8, 1.1)
1975–1991	Ref	Ref	Ref
Educational attainment			
High school graduate	1.2 (1.0, 1.4)	1.0 (.9, 1.2)	.8 (.7, .9)[c]
Less than high school	Ref	Ref	Ref
Ever homeless			
Yes	1.2 (1.0, 1.5)[e]	1.7 (1.5, 2.0)[c]	1.9 (1.7, 2.1)[c]
No	Ref	Ref	Ref

	Shared With HCV(−) Partner vs No Sharing	Shared With HCV(+)Partner vs No Sharing	Shared With HCV (Unknown) Partner vs No Sharing
Participant Characteristic	**Adjusted[b] OR (95% CI)**	**Adjusted[b] OR (95% CI)**	**Adjusted[b] OR (95% CI)**
Employment status			
Unemployed	1.2 (.9, 1.6)	1.2 (.9, 1.5)	1.1 (1.0, 1.3)
Disabled	1.4 (1.0, 1.9)	1.3 (1.0, 1.7)	.9 (.8, 1.1)
Other	1.6 (1.0, 2.4)[e]	.8 (.5, 1.2)	.9 (.7, 1.1)
Employed	Ref	Ref	Ref
Age at first injection, years			
≥25	.9 (.6, 1.2)	.7 (.5, .9)[d]	1.0 (.9, 1.2)
18–24	.8 (.7, 1.1)	.9 (.8, 1.1)	1.0 (.8, 1.1)
<18	Ref	Ref	Ref

Abbreviations: CI, confidence interval; HCV, hepatitis C virus; NHBS, National HIV Behavioral Surveillance System; OR, odds ratio.

[a]Does not include n = 78 participants with missing data for at least one of the variables in the model.

[b]Model adjusted for all variables shown in table plus participant's income category and injection history duration.

[c]<.001.

[d]<.01.

[e]<.05.

Table 3

Adjusted Odds Ratios for the Association Between Participant's Self-reported HCV Status and Knowledge of Last Injection Partner's HCV Status, NHBS Injection Drug Users Second Cycle (N = 4506[a]), 2009

Participant Characteristic	Adjusted[b] OR (95% CI)	*P* Value
Self-reported HCV status		
Negative	2.5 (2.0, 3.0)	<.001
Positive	4.1 (3.4, 4.9)	<.001
Unknown	Ref	
Gender		
Female	1.8 (1.6, 2.1)	<.001
Male	Ref	. . .
Race/ethnicity		
Black	.5 (.4, .6)	<.001
White	1.5 (1.2, 1.8)	<.001
Hispanic	Ref	. . .
Birth year		
1930–1944	.9 (.7, 1.1)	.318
1945–1954	.9 (.6, 1.2)	.317
1955–1964	1.0 (.7, 1.4)	.914
1965–1974	1.2 (.5, 2.6)	.715
1975–1991	Ref	. . .
Educational attainment		
High school graduate	1.3 (1.1, 1.5)	<.001
Less than high school	Ref	. . .
Ever homeless		
Yes	.8 (.7, .9)	<.01
No	Ref	. . .
Employment status		
Unemployed	1.0 (.8, 1.3)	.727
Disabled	1.5 (1.1, 1.9)	<.01
Other	1.3 (.9, 1.8)	.225
Employed	Ref	. . .
Annual income		
$15 000 or more	1.2 (1.0, 1.4)	<.05
$0–$14 999	Ref	. . .
Age at first injection, years		
≥25	.8 (.6, 1.0)	.079
18–24	.9 (.7, 1.0)	.097
<18	Ref	. . .

Abbreviations: CI, confidence interval; HCV, hepatitis C virus; NHBS, National HIV Behavioral Surveillance System; OR, odds ratio.

[a] Does not include n = 36 participants with missing data for at least one of the variables in the model.

[b] Model adjusted for all variables shown in table plus participant's injection history duration.

Table 4

Adjusted Odds Ratios for the Association Between Participant's Self-reported HCV Status and Last Injection Partner's HCV Status, NHBS Injection Drug Users Second Cycle (N = 1698[a]), 2009

Participant Characteristic	Adjusted[b] OR (95% CI)	*P* Value
Self-reported HCV status		
Negative	.4 (.3, .6)	<.001
Positive	4.6 (3.2, 6.4)	<.001
Unknown	Ref	. . .
Gender		
Female	1.1 (.8, 1.4)	.539
Male	Ref	. . .
Race/ethnicity		
Black	.6 (.4, .8)	<.01
White	1.0 (.7, 1.3)	.963
Hispanic	Ref	. . .
Birth year		
1930–1944	1.6 (1.0, 2.4)	<.05
1945–1954	2.0 (1.2, 3.6)	<.05
1955–1964	1.8 (.9, 3.4)	.088
1965–1974	3.9 (.9, 17.3)	.073
1975–1991	Ref	. . .
Educational attainment		
High school graduate	.9 (.7, 1.1)	.318
Less than high school	Ref	. . .
Ever homeless		
Yes	1.5 (1.1, 1.9)	<.01
No	Ref	. . .
Employment status		
Unemployed	.9 (.6, 1.4)	.704
Disabled	.8 (.5, 1.3)	.396
Other	.6 (.3, 1.0)	.065
Employed	Ref	. . .
Annual income		
$15 000 or more	1.1 (.8, 1.5)	.398
$0–$14 999	Ref	. . .
Age at first injection, years		
≥25	.7 (.4, 1.1)	.122
18–24	1.0 (.8, 1.4)	.839
<18	Ref	. . .

Abbreviations: CI, confidence interval; HCV, hepatitis C virus; NHBS, National HIV Behavioral Surveillance System; OR, odds ratio.

[a]Does not include n = 14 participants with missing data for at least one of the variables in the model.

[b]Model adjusted for all variables shown in table plus participant's injection history duration